ST-A30L

339

AEP Model
UK Model

FM STEREO/FM-AM TUNER

SPECIFICATIONS

GENERAL

System: FM stereo, FM/AM superheterodyne tuner
Acute Servo Lock system

Power Requirements: 220 V ac ∿, 50/60 Hz (AEP model)
240 V ac ∿, 50/60 Hz (UK model)

Power Consumption: 7W

Dimensions: Approx. 430 (w) × 80 (h) × 275 (d) mm
17 (w) × 3 1/4 (h) × 10 7/8 (d) inches
including projecting parts and controls

Weight: Approx. 3.6 kg, 7 lb 15 oz (net)
Approx. 4.4 kg, 9 lb 12 oz (in shipping carton)

FM TUNER SECTION

Tuning Range: 87.5–108 MHz

Antenna Terminals: 300Ω balanced
75Ω unbalanced

Intermediate Frequency: 10.7 MHz

Sensitivity at 46 dB Quieting: 3.5μV, 16.1 dBf (mono)
(40 kHz deviation) 40μV, 37.3 dBf (stereo)

Usable Sensitivity: 1.3μV, S/N = 26 dB (40 kHz deviation)
1.8μV, 10.3 dBf; IHF

Limiting Threshold: 1μV (–3 dB)

S/N Ratio: 65 dB (mono)
(40 kHz deviation) 60 dB (stereo)

Harmonic Distortion: at 100 Hz
0.15% (mono)
0.4% (stereo)
at 1 kHz
0.15% (mono)
0.4% (stereo)
at 10 kHz
0.3% (mono)
0.6% (stereo)

IM Distortion: 0.15% (mono)
(40 kHz deviation) 0.4% (stereo)

Separation: 35 dB at 100 Hz
45 dB at 1 kHz
32 dB at 10 kHz

– Continued on page 2 –

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SONY®
SERVICE MANUAL

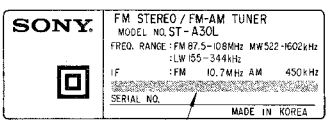
Frequency Response:	40 Hz–12.5 kHz ± 1 dB
Selectivity:	50 dB (300 kHz) 75 dB (400 kHz)
Capture Ratio:	1.0 dB
AM Suppression Ratio:	55 dB
Image Response Ratio:	50 dB
IF Response Ratio:	95 dB
Spurious Response Ratio:	75 dB
RF Intermodulation:	60 dB
Sub-carrier Product Ratio:	50 dB
Muting Threshold:	Approx. 5 μV
Output Level/Impedance:	750 mV, 4.7 kΩ (at 75 kHz deviation)

AM (MW and LW) TUNER SECTION

		MW	LW
Tuning Range		522–1,602 kHz	155–344 kHz
Antenna	Built-in	provided	provided
	External	provided	provided
Intermediate Frequency		450 kHz	
Usable Sensitivity	Built-in antenna	250 μV/m (1,000 kHz)	500 μV/m (250 kHz)
	External antenna	100 μV (1,000 kHz)	100 μV (250 kHz)
S/N Ratio		50 dB (50 mV/m)	50 dB (50 mV/m)
Harmonic Distortion		0.5% (50 mV/m, 400 Hz)	0.5% (50 mV/m, 400 Hz)
Selectivity		45 dB (9 kHz)	45 dB (9 kHz)
Image Response Ratio		45 dB (1,000 kHz)	75 dB (250 kHz)
IF Response Ratio		40 dB (1,000 kHz)	———

MODEL IDENTIFICATION

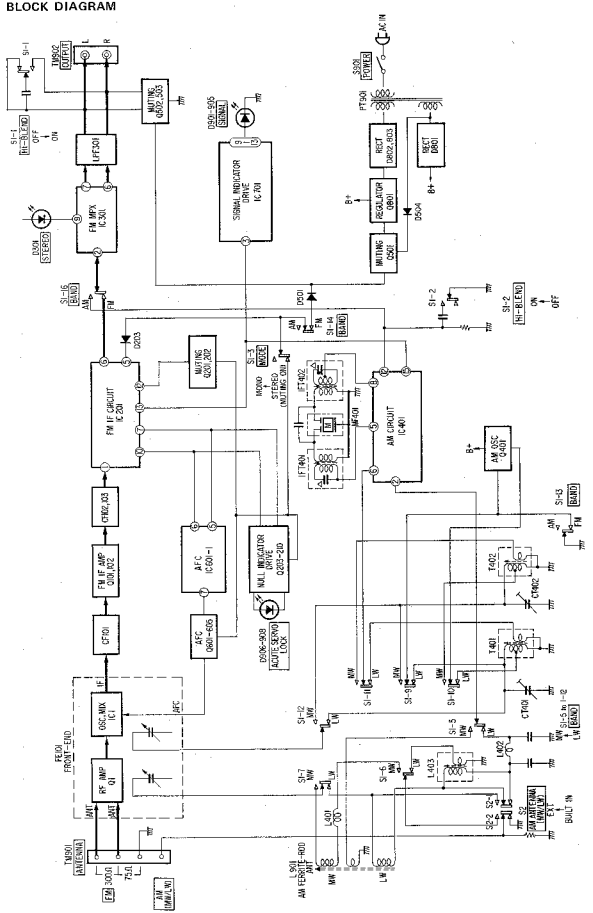
– Specification Label –



AEP model: 220 V ∿ 50/60 Hz 7 W
UK model: 240 V ∿ 50/60 Hz 7 W

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



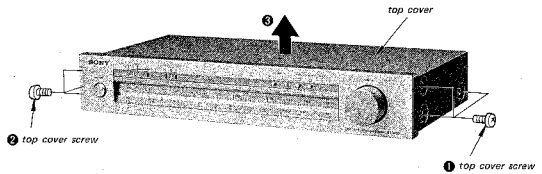
MEMO

SECTION 2
DISASSEMBLY

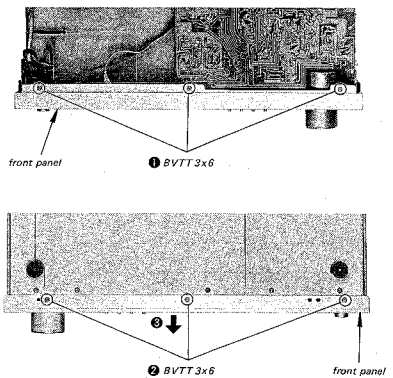
2-1. REMOVAL

Note: Follow the disassembly procedure in the numerical order given.

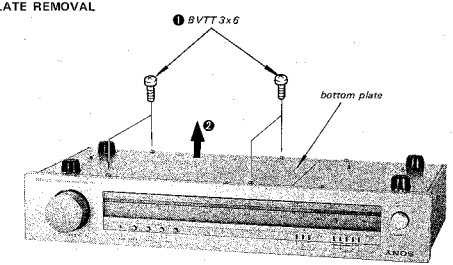
TOP COVER REMOVAL



FRONT PANEL REMOVAL



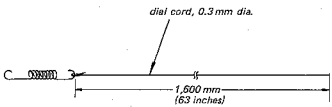
BOTTOM PLATE REMOVAL



2-2. DIAL CORD STRINGING

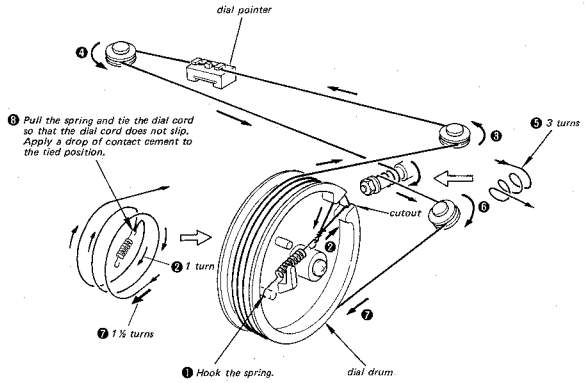
Perform after removing the guide-cord.
Perform the guide-cord stringing after stringing the dial cord. (See page 8.)

1. Preparation



2. Stringing

Turn the tuning capacitor shaft fully clockwise and set the dial drum so that the cutout is positioned as shown below.



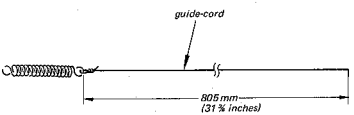
3. Dial Pointer Installation

1. Receive a broadcasting station signal and set the dial pointer on the dial scale.
2. Apply a drop of contact cement to the dial pointer.

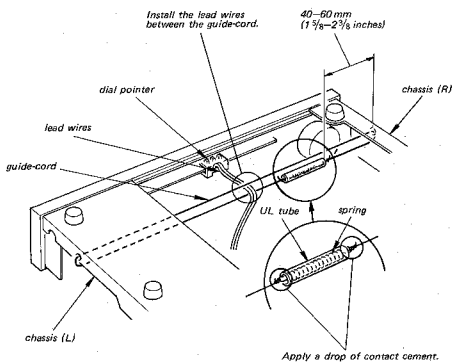
2-3. GUIDE-CORD STRINGING

Perform the guide-cord stringing after stringing the dial cord.

1. Preparation



2. Stringing



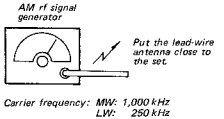
SECTION 3
ADJUSTMENTS

MW/LW SECTION

Setting:

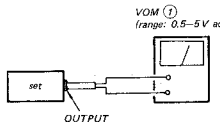
BAND selector: MW or LW
AM ANTENNA switch: BUILT IN

Setup:

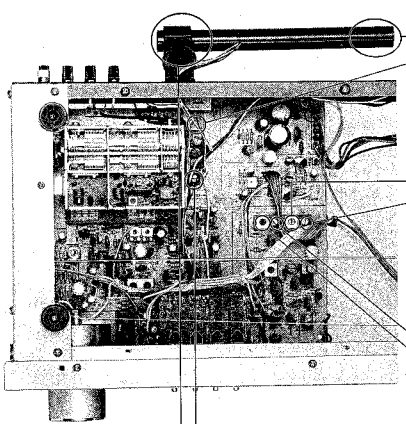


Carrier frequency: MW: 1,000 kHz
LW: 250 kHz

30% amplitude modulation by 400 Hz signal



- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.



LW TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM (1).	
L901	145 kHz
CT402	365 kHz

LW FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM (1).	
T401	145 kHz
CT401	365 kHz

MW FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM (1).	
CT403	1,660 kHz
T402	515 kHz

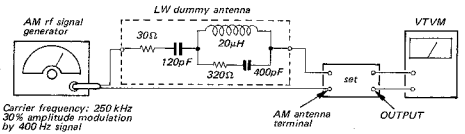
MW TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM (1).	
CT404	1,400 kHz
L901	600 kHz

LW EXT Antenna Coil Adjustment

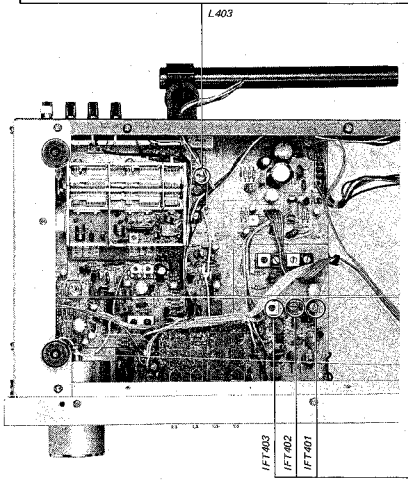
Setting:

BAND selector: LW
AM ANTENNA switch: EXT

Procedure:

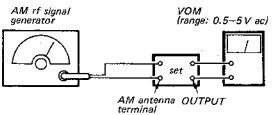


Tune the set to 250 kHz and adjust L403 for a maximum reading on VTVM.



AM IF Alignment

Procedure:

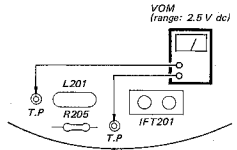


Carrier frequency: 1,000 kHz
30% amplitude modulation
by 400 Hz signal
Output level: as low as possible

1. Tune the set to 1,000 kHz and adjust IFT401–403 for a maximum reading on VOM.
2. Repeat the procedure in adjustment several times.

FM SECTION

FM Discriminator Alignment 1



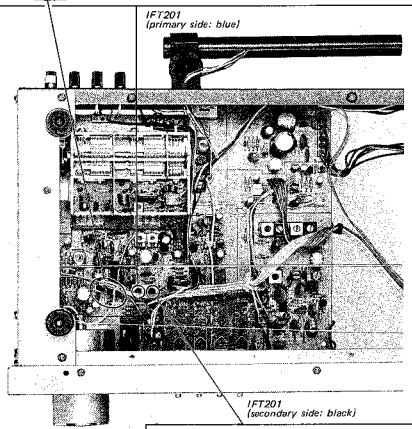
Setting:

MODE switch: MONO

Procedure:

1. Detune the set.
2. Adjust the blue core (primary-side) of IFT201 for 0 V reading on VOM.

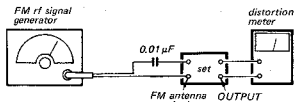
Note: When replacing the ceramic filter (CF101–103), perform this alignment.



FM Discriminator Alignment 2

Setting:

MODE switch: MONO



Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Modulation: 400 Hz, 75 kHz deviation (100 %)

Procedure:

Adjust the black core (secondary side) of IFT201 for minimum distortion.

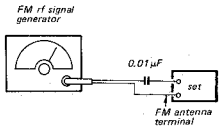
VCO Adjustment

A) Regular Method

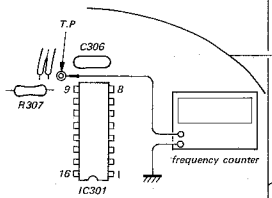
Setting:

MODE switch: MONO

Procedure:



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 1 mV (60 dB)

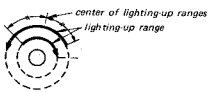


1. Tune the set to 98 MHz.
2. Adjust RT301 for 76 kHz ± 100 Hz on the counter.

B) Simple Method

Procedure:

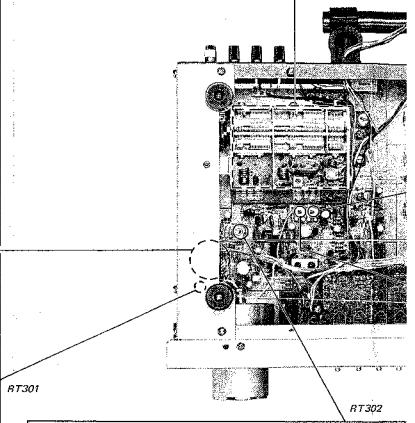
1. Tune the set to the FM stereo broadcasting signal.
2. Turn RT301 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
3. Secure RT301 at the center of the lighting-up range of both turns as shown below.



FM FREQUENCY COVERAGE ADJUSTMENT, FM TRACKING ADJUSTMENT and FM IF ALIGNMENT

The front-end section has been carefully adjusted at the factory, so the adjustment is unnecessary in the field.

FRONT-END SECTION

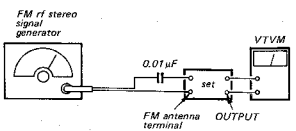


FM Stereo Separation Adjustment

Setting:

MODE switch: STEREO (muting ON)

Procedure:



Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Modulation:
Audio (400 Hz): 33.75 kHz deviation (45%)
Pilot (19 kHz): 7.5 kHz deviation (10%)

ST-A30L

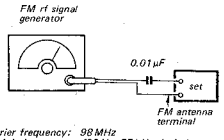
VCO Adjustment

A) Regular Method

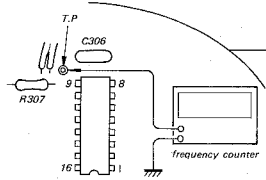
Setting:

MODE switch: MONO

Procedure:



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 1 mV (60 dB)

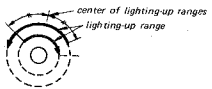


1. Tune the set to 98 MHz.
2. Adjust RT301 for 76 kHz ±100 Hz on the counter.

B) Simple Method

Procedure:

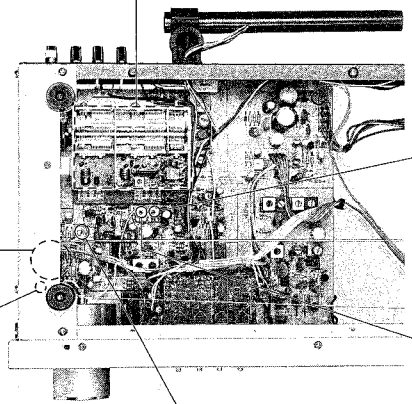
1. Tune the set to the FM stereo broadcasting signal.
2. Turn RT301 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
3. Secure RT301 at the center of the lighting-up range of both turns as shown below.



FM FREQUENCY COVERAGE ADJUSTMENT, FM TRACKING ADJUSTMENT and FM IF ALIGNMENT

The front-end section has been carefully adjusted at the factory, so the adjustment is unnecessary in the field.

FRONT-END SECTION

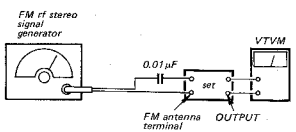


FM Stereo Separation Adjustment

Setting:

MODE switch: STEREO (muting ON)

Procedure:



Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Modulation:
Audio (400 Hz): 33.75 kHz deviation (45%)
Pilot (19 kHz): 7.5 kHz deviation (10%)

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RT302 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RT302 for minimum reading.

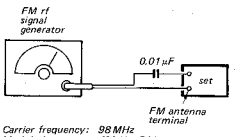
L-CH Stereo separation: Ⓐ − Ⓑ
R-CH Stereo separation: Ⓒ − Ⓓ

The separations of both channels should be equal.

Signal Indicator Level Adjustment

Setup:

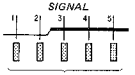
MODE switch: MONO



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 1 mV (60 dB)

Procedure:

Tune the set to 98 MHz and adjust RT201 so that all signal elements light up. (See figure below.)

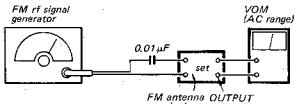


FM Muting Level Adjustment

Setting:

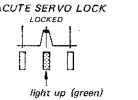
MODE switch: STEREO (muting ON)

Procedure:



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100%)
Output level: 7.9 μV (18 dB)

1. Tune the set to 98 MHz.
2. Turn RT202 and stop it just when the VOM indication suddenly decreases.
3. Receive a signal stronger than the muting level. Confirm that the ACUTE SERVO LOCK lamp (green) lights up. (See figure below.)



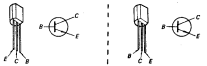
SECTION 4
DIAGRAMS

Replacement Semiconductors

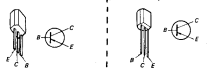
For replacement, use semiconductors except in ( ).

Q101, 102 / Q401: 2SC710-15 (2SC710D)

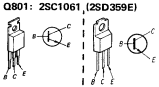
Q201–206 / Q501–503 / Q601–605: 2SC1364 (2SC711G)



Q207–210: 2SA1027R (2SA628G)



Q801: 2SC1061 (2SD359E)



IC201: LA1231 (LA1231N)
IC301: μPC1161C
IC401: LA1240

IC601: μPC4558C

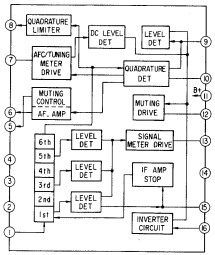
IC701: LB1416

D201–204 / D302 / D501–504 / D601: 1S1555 (1S2473)
D602: 1T22AM (1S188AM)
D801–803: 10E2 (1N4002)
D804: RD13E (RD13E-B)

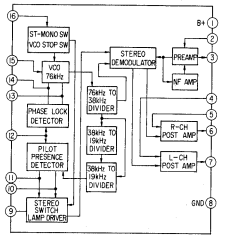
D301: AR3111D

D901–906: SLP241D
D907, 908: SLP141D

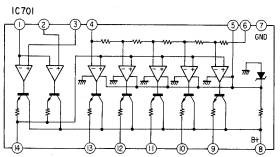
IC201



IC301



IC701



Note:

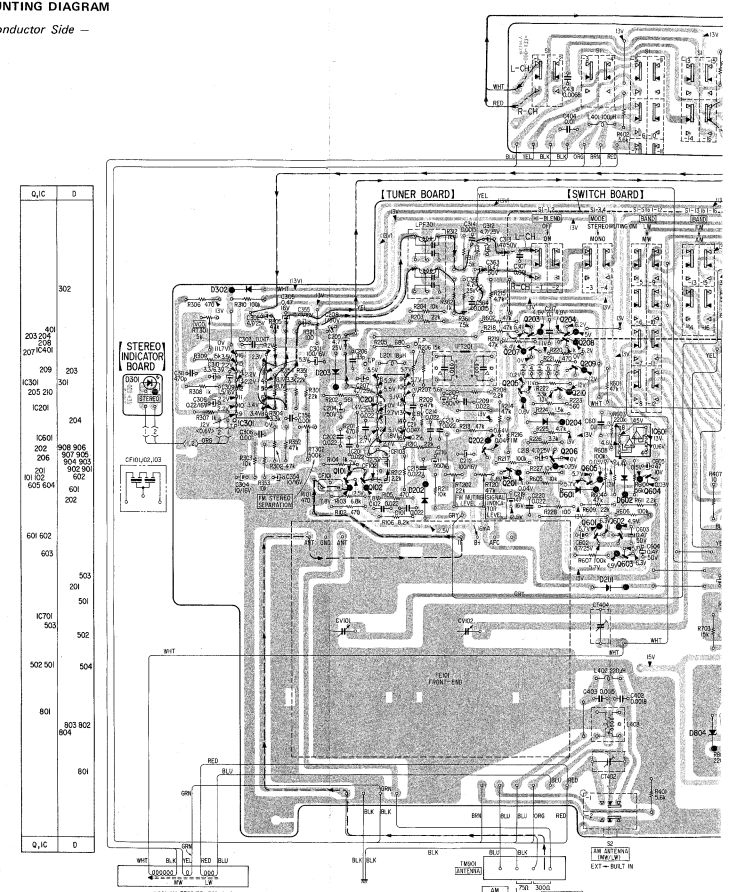
- ⊣⊢ : indicates side identified with part number.
- ——▶ : signal path
- —·—▶ : L-CH
- - - -▶ : R-CH
- ▒▒ : B+ pattern
- Readings are taken under detuned conditions with a VOM (20 kΩ/V).
  no mark: FM
  ( ): AM
  ( ): FM STEREO ··· With signal input

A B C D

1 2 3 4 5

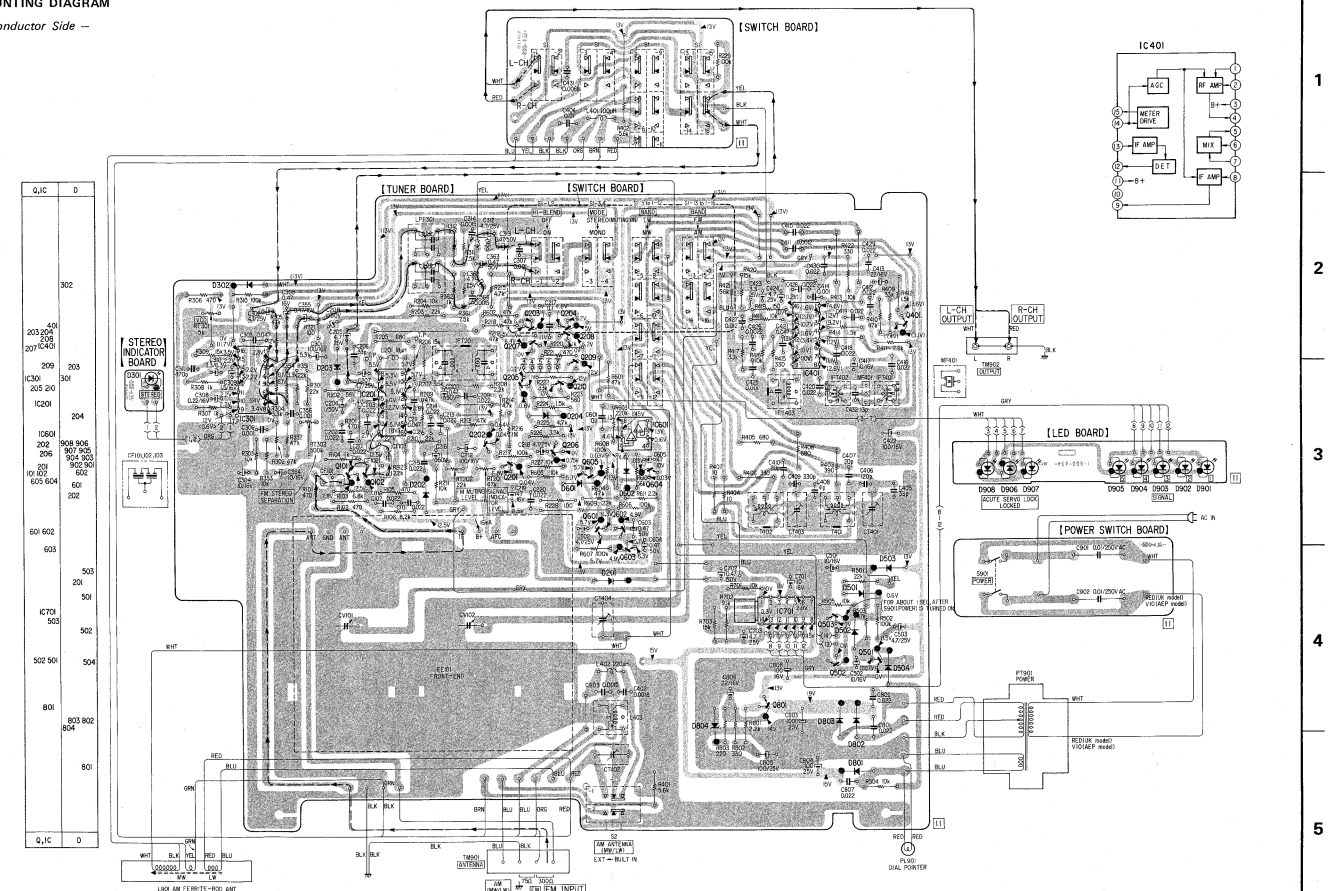
4-1. MOUNTING DIAGRAM

– Conductor Side –

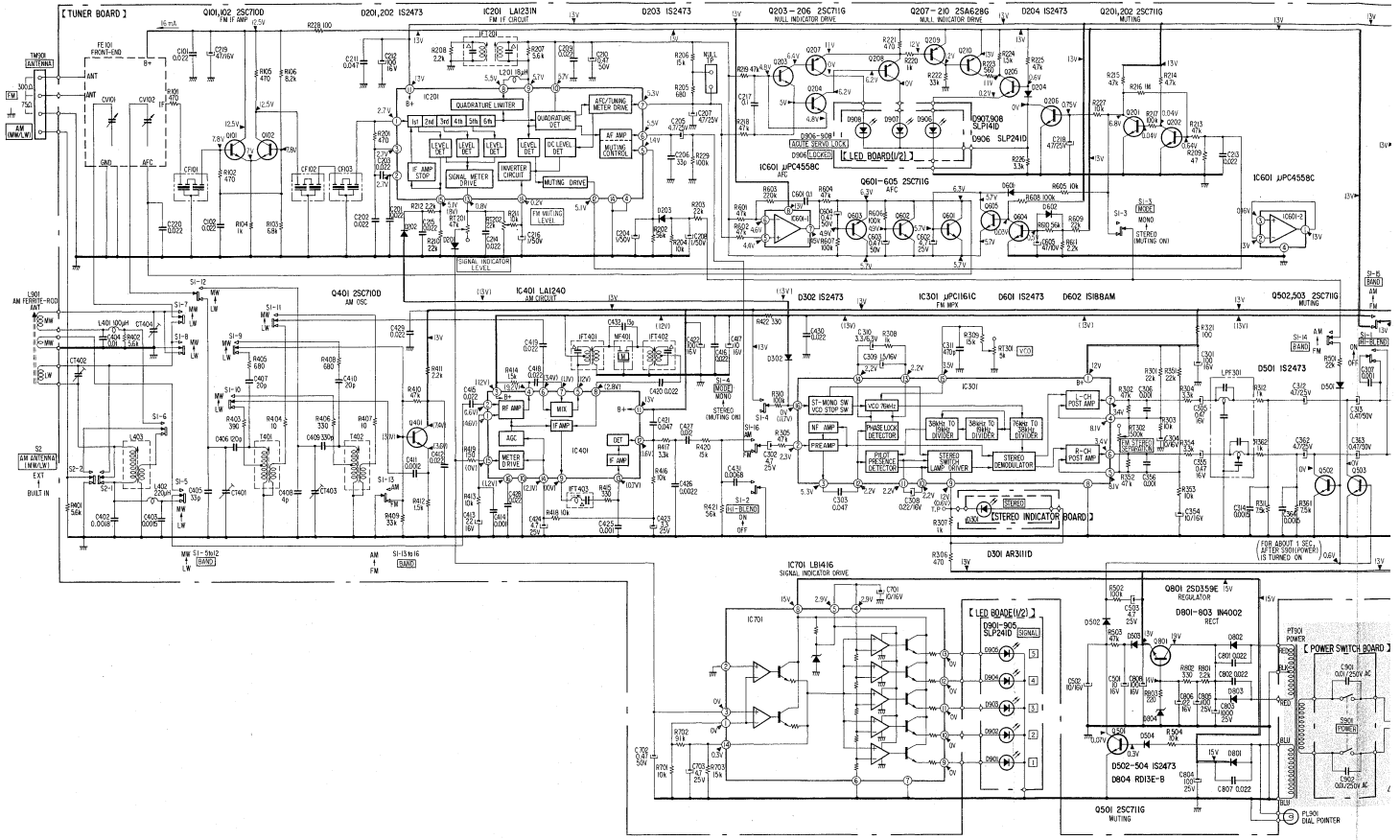


4-1. MOUNTING DIAGRAM

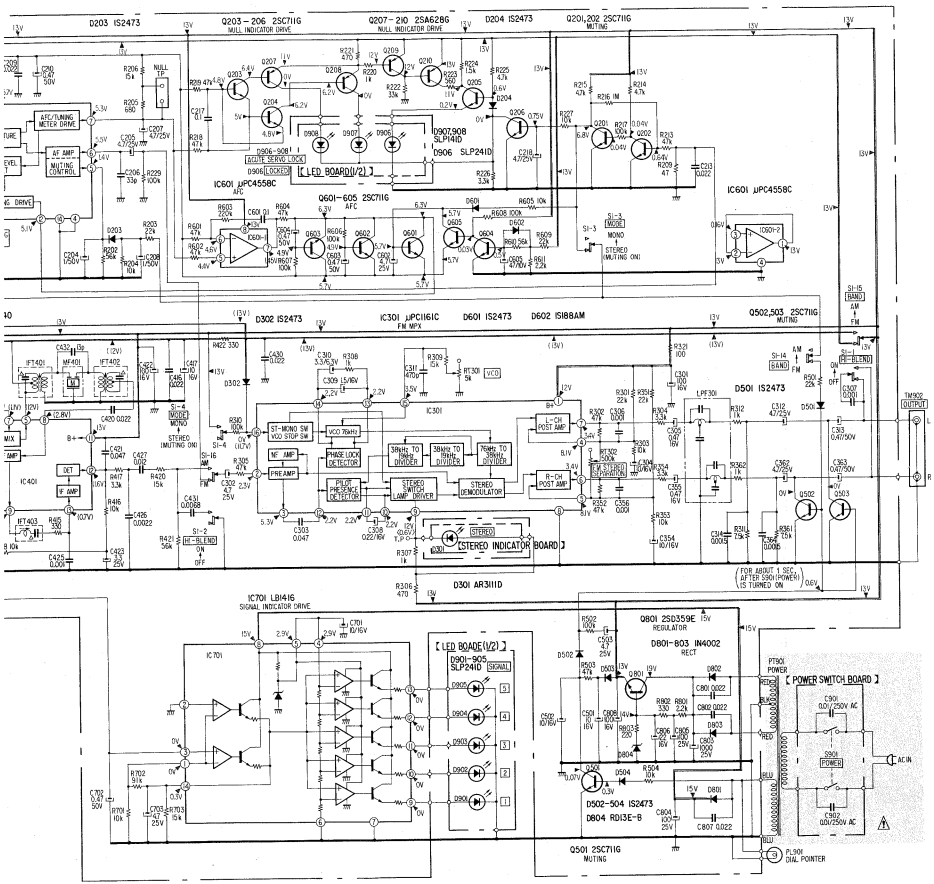
– Conductor Side –



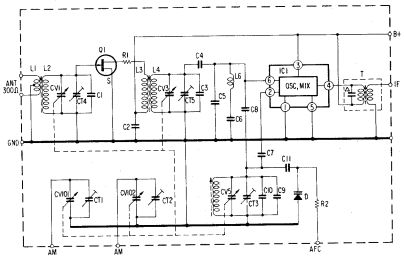
4-2. SCHEMATIC DIAGRAM



ST-A30L



FE101 FRONT-END



Note:

- Front-end reference numbers are not included in the Electrical Parts List.
- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ: 1000Ω, MΩ: 1000 kΩ
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- △: internal component.
- ——: B+ bus.
- ▭: panel designation.
- ▭: adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under detuned conditions with a VOM (20 kΩ/V).
  no mark: FM
  ( ): AM
  〈 〉: FM STEREO · · · With signal input
- Voltage variations may be noted due to normal production tolerances.
- Switch

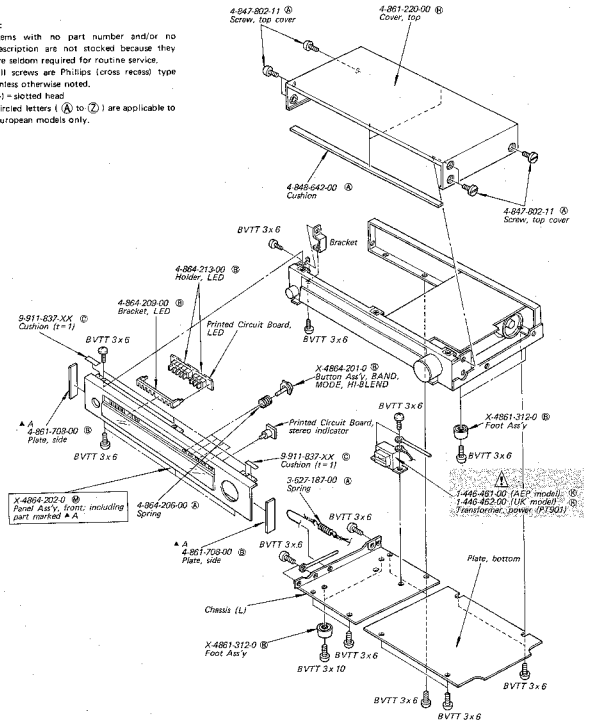
Ref. No.	Switch	Position
S1-1, 2	HI-BLEND	OFF
S1-3, 4	MODE	STEREO (MUTING ON)
S1-5 to 1-12	BAND	LW
S1-13 to 1-16	BAND	FM
S2-1, 2	AM ANTENNA (MW/LW)	BUILT IN
S901	POWER	OFF

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SECTION 5
EXPLODED VIEWS

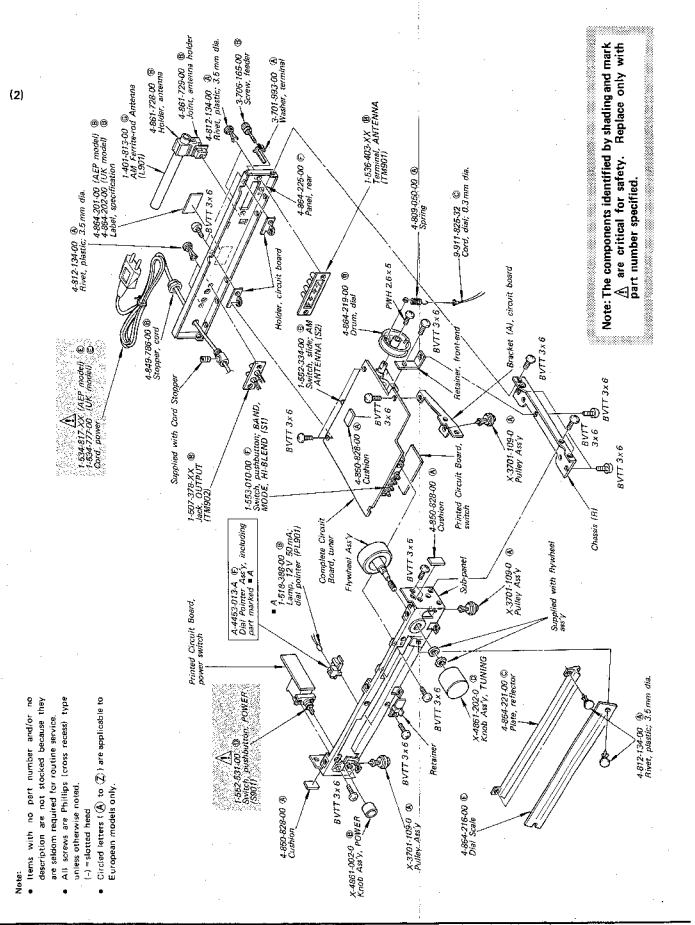
(1)

Note:
- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

(2)

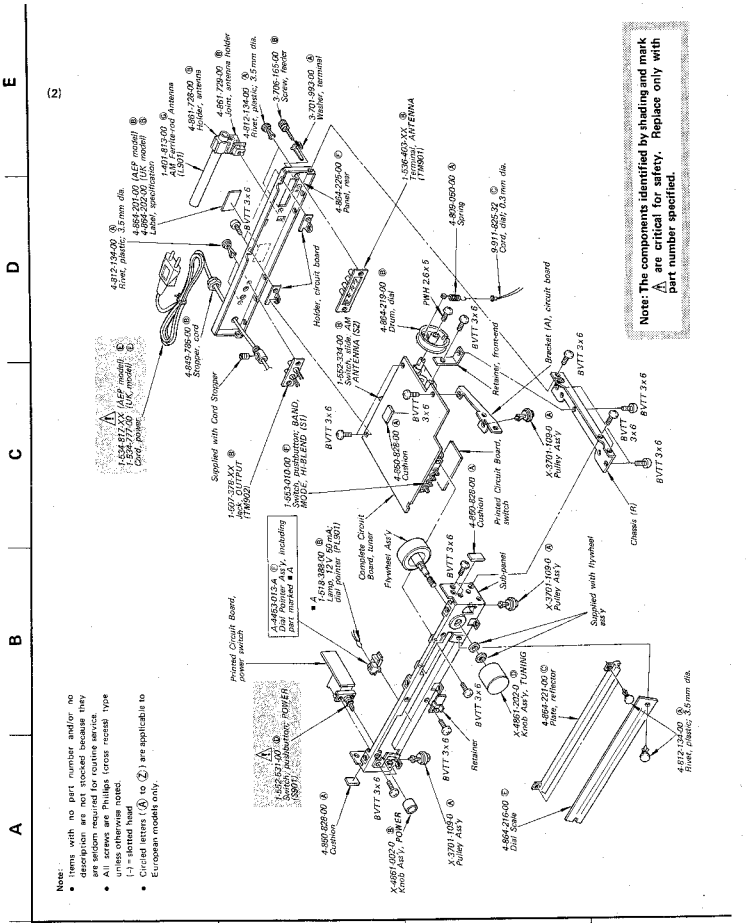

4-812-134-00 Ⓐ Rivet, plastic; 3.5 mm dia.
4-864-201-00 (AEP model) Ⓖ
4-864-202-00 (UK model) Ⓖ
Button Ass'y, BAND, MODE, HI-BLEND
1-401-913-00 Ⓐ AM Ferrite-rod Antenna (L201)
4-861-728-00 Ⓑ Holder, antenna
4-861-729-00 Ⓑ Joint, antenna holder
4-812-134-00 Ⓐ Rivet, plastic; 3.5 mm dia.
3-705-165-00 Ⓐ Screw, leader
3-701-593-00 Ⓐ Washer, terminal
1-536-403-XX Ⓑ Antenna Ass'y, AM ANTENNA (TM901)
4-864-225-00 Ⓒ Panel, rear
BVTT 3x6
4-809-050-00 Ⓐ Spring
9-911-825-12 Ⓒ Cord, plain; 0.3 mm dia.
4-812-134-00 Ⓐ Rivet, plastic; 3.5 mm dia.
4-848-786-00 Ⓐ Stopper, cord
Supplied with Cord Stopper
1-534-617-XX (AEP model) Ⓔ
1-534-777-00 (UK model) Ⓔ
Cord, power
1-507-376-XX Ⓐ Cord, connecting (TM902)
Holder, circuit board
1-562-334-00 Ⓑ Antenna Ass'y, AM ANTENNA (SZ)
4-864-219-00 Ⓑ Drum, dial
PWH 2.6x5
BVTT 3x6
Retainer, front-end
Bracket (A), circuit board
4-860-928-00 Ⓐ Cushion
1-553-010-00 Ⓒ Switch, push-button (BAND, MODE, HI-BLEND) (S91)
Printed Circuit Board, switch
X-3701-109-0 Ⓐ Pulley Ass'y
Chassis (R)
A-4463-013-A Ⓐ Dial Pointer Ass'y, including Lamp, marked ▲A
1-516-388-00 Ⓐ Lamp, 12 V 50 mA, dial pointer (PL201)
Complete Circuit Board, tuner
Flywheel Ass'y
4-860-928-00 Ⓐ Cushion
Shaft, panel
X-3701-105-0 Ⓐ Pulley Ass'y
Supplied with flywheel ass'y
Printed Circuit Board, power switch
1-562-531-00 Ⓑ Switch, push-button (POWER) (S901)
4-869-824-00 Ⓐ Cushion
X-4861-302-0 Ⓑ Knob Ass'y, POWER
X-3701-105-0 Ⓐ Pulley Ass'y
Retainer
X-4861-292-0 Ⓑ Knob Ass'y, TUNING
4-864-221-00 Ⓒ Plate, reflector
4-864-216-00 Ⓒ Dial Scale
4-812-134-00 Ⓐ Rivet, plastic; 3.5 mm dia.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note:
- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.

⇒ Q101
⇒ Q201
⇒ Q207
⇒ Q401
⇒ Q501
⇒ Q601
⇒ Q801
⇒ IC201
IC301
IC401
IC601
IC701
⇒ D201
D301
⇒ D302
⇒ D501
⇒ D601
⇒ D602
⇒ D801
⇒ D804
D901
D907
IFT401
IFT402
IFT403
L201
L401
L402
L403
⇒: D


(2)
Note:
• Items with no part number and/or no description are not stocked because they are seldom required for routine service.
• All screws are Phillips (cross recess) type unless otherwise noted.
[-] = slotted head
• Circled letters (Ⓐ to Ⓩ) are applicable to European models only.
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.
Supplied with Cord Stopper
Holder, circuit board
Bracket (A), circuit board
Retainer, front-end
Chassis (H)
Printed Circuit Board, power switch
Complete Circuit Board, tuner
Flywheel Ass'y
Printed Circuit Board, switch
Subpanel
Supplied with flywheel ass'y
Retainer
Dial Scale
Plate, reflector
Knob Ass'y, TUNING
Knob Ass'y, POWER
Cushion
Spring
Drum, dial
Pulley Ass'y
Dial Pointer Ass'y, including Lamp, 12V, 50 mA
Lamp, 12V, 50 mA, dial pointer (PL501)
Holder, antenna
Joint, antenna holder
Ferrite-rod Antenna (LW)
Label, specification
Stopper, cord
Cord, (AEP model)
Cord, (UK model)
Power
Switch, pushbutton, POWER (SW1)
Terminal, ANTENNA (T9901)
Terminal, ANTENNA (SZ)
Terminal, ANTENNA (LW)
Terminal, ANTENNA (MW)
Terminal, ANTENNA (SW)
Terminal, ANTENNA (FM)
Terminal, ANTENNA (GND)
Terminal, ANTENNA (PHONE)
Terminal, ANTENNA (EARTH)
Terminal, ANTENNA (TV)
Terminal, ANTENNA (TV)
Terminal, ANTENNA (TV

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.		Description		
C305	1-131-455-00	Ⓐ	0.47	16 V	tantalum
C306,307	1-108-227-00	Ⓐ	0.001		mylar
C308	1-131-453-00	Ⓐ	0.22	16 V	tantalum
C309	1-131-416-00	Ⓑ	1.5	16 V	tantalum
C310	1-131-422-00	Ⓑ	3.3	6.3 V	tantalum
C311	1-104-069-00	Ⓐ	470p		polystyrol
C312	1-121-395-00	Ⓐ	4.7	25 V	elect
C313	1-121-726-00	Ⓐ	0.47	50 V	elect
C314	1-108-228-00	Ⓐ	0.0015		mylar
C354	1-121-651-00	Ⓐ	10	16 V	elect
C355	1-131-455-00	Ⓐ	0.47	16 V	tantalum
C356	1-108-227-00	Ⓐ	0.001		mylar
C362	1-121-395-00	Ⓐ	4.7	25 V	elect
C363	1-121-726-00	Ⓐ	0.47	50 V	elect
C364	1-108-228-00	Ⓐ	0.0015		mylar
C402	1-103-731-00	Ⓐ	0.0018		polystyrol
C403	1-104-081-00	Ⓐ	0.0015		polystyrol
C404	1-108-239-00	Ⓐ	0.01		mylar
C405	1-102-963-00	Ⓐ	33p		
C406	1-104-055-00	Ⓐ	120p		polystyrol
C407	1-101-974-00	Ⓐ	20p		
C408	1-102-941-00	Ⓐ	4 p		
C409	1-104-065-00	Ⓐ	330p		polystyrol
C410	1-101-974-00	Ⓐ	20p		
C411	1-108-351-00	Ⓐ	0.0012		mylar
C412	1-101-005-00	Ⓐ	0.022		
C413	1-121-479-00	Ⓐ	22	16 V	elect
C414	1-102-074-00	Ⓐ	0.001		
C415,416	1-101-005-00	Ⓐ	0.022		
C417	1-121-651-00	Ⓐ	10	16 V	elect
C418,419	1-101-005-00	Ⓐ	0.022		
C420	1-108-242-00	Ⓐ	0.022		mylar
C421	1-101-006-00	Ⓐ	0.047		
C422	1-121-415-00	Ⓐ	100	16 V	elect
C423	1-121-392-00	Ⓐ	3.3	25 V	elect
C424	1-121-395-00	Ⓐ	4.7	25 V	elect
C425	1-102-074-00	Ⓐ	0.001		
C426	1-108-230-00	Ⓐ	0.0022		mylar
C427	1-108-357-00	Ⓐ	0.012		mylar
C428–430	1-101-005-00	Ⓐ	0.022		

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.		Description		
C431	1-108-237-00	Ⓐ	0.0068		mylar
C432	1-102-511-00	Ⓐ	13p		
C501,502	1-121-651-00	Ⓐ	10	16 V	elect
C503	1-121-395-00	Ⓐ	4.7	25 V	elect
C601	1-108-603-00	Ⓑ	0.1		mylar
C602	1-121-395-00	Ⓐ	4.7	25 V	elect
C603,604	1-121-726-00	Ⓐ	0.47	50 V	elect
C605	1-121-352-00	Ⓐ	47	10 V	elect
C701	1-121-651-00	Ⓐ	10	16 V	elect
C702	1-121-726-00	Ⓐ	0.47	50 V	elect
C703	1-121-395-00	Ⓐ	4.7	25 V	elect
C801,802	1-101-005-00	Ⓐ	0.022		
C803	1-121-657-00	Ⓑ	1000	25 V	elect
C804,805	1-121-416-00	Ⓑ	100	25 V	elect
C806	1-121-479-00	Ⓐ	22	16 V	elect
C807	1-101-005-00	Ⓐ	0.022		
C808	1-121-415-00	Ⓐ	100	16 V	elect
C901,902	⚠ 1-130-196-00	Ⓓ	0.01	250 V	ac film
CT401,402	1-141-147-XX	Ⓑ	Trimmer		
CT403,404	1-141-138-XX	Ⓐ	Trimmer		

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted.
Refer to the list on page 25 for their part numbers.

⇒ RT201	1-226-238-00	Ⓐ	50 k-B, adjustable; signal indicator level
⇒ RT202	1-226-237-00	Ⓐ	20 k-B, adjustable; FM muting level
RT301	1-226-652-00	Ⓑ	5 k-B, adjustable; VCO
RT302	1-226-653-00	Ⓑ	500 k-B, adjustable; FM stereo separation

SWITCHES

S1	1-553-010-00	Ⓕ	Pushbutton, BAND, MODE, HI-BLEND
S2	1-552-334-00	Ⓑ	Slide, AM ANTENNA
S901	⚠ 1-552-531-00	Ⓓ	Pushbutton, POWER

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
		MISCELLANEOUS
CF101–103	1-527-496-00	Ⓑ Filter, ceramic
FE101	1-463-280-00	Ⓜ Front-end
LPF301	1-231-589-00	Ⓔ Filter, low-pass
MF401	1-527-538-00	Ⓒ Filter, mechanical
PL901	1-518-388-00	Ⓑ Lamp, 12 V 50 mA; dial pointer
TM901	1-536-403-XX	Ⓑ Terminal, ANTENNA
TM902	1-507-378-XX	Ⓑ Jack, OUTPUT
⚠	1-534-777-00	Ⓔ Cord, power (UK model)
⚠	1-534-817-XX	Ⓔ Cord, power (AEP model)

ACCESSORIES & PACKING MATERIALS

Part No.	*Description*
1-501-161-00	Ⓒ FM Ribbon Antenna
1-551-918-00	Ⓓ Cord, connection
3-701-630-00	Ⓐ Bag, plastic; for accessories
3-770-909-11	Ⓒ Manual, instruction
4-861-226-00	Ⓐ Bag, plastic; for set
4-864-236-00	Ⓒ Cushion
4-864-239-00	Ⓓ Carton

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

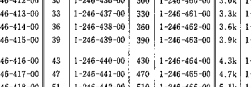
1/4 WATT CARBON RESISTORS Ⓐ

Note: Circled letter Ⓐ is applicable to European models only.

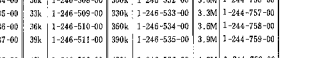
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	